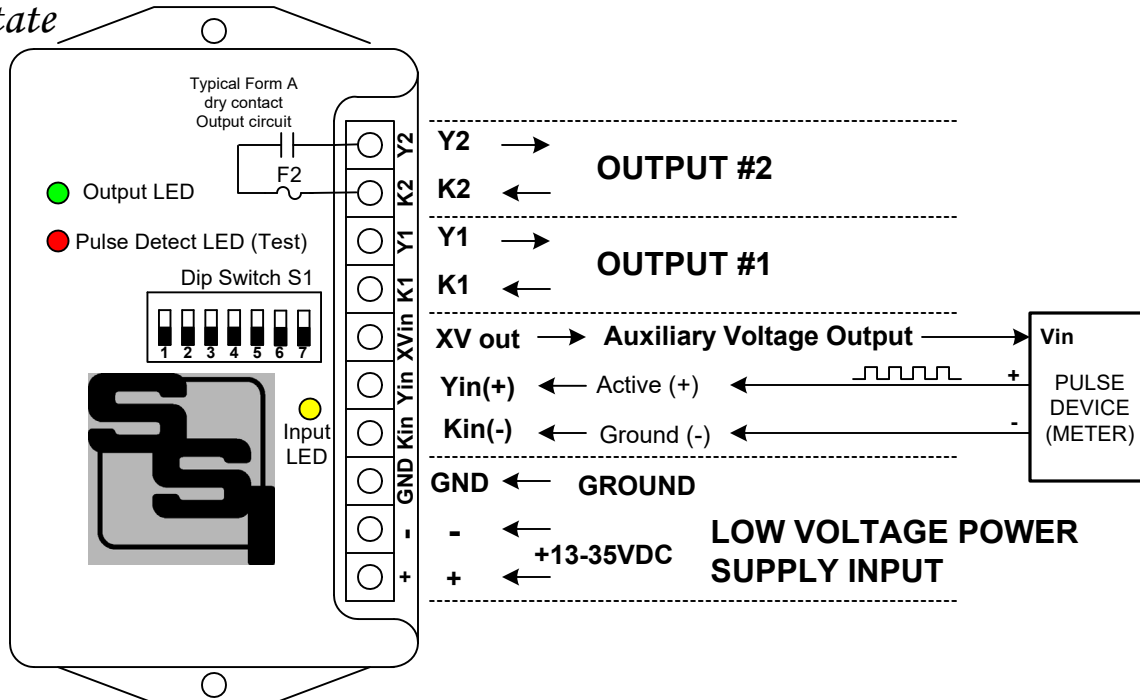


RTR-2SP

*Standard
Solid State*

PULSE ISOLATION RELAY INSTRUCTION SHEET



POWER INPUT - For a DC power supply of +13VDC to +35VDC, connect the "+" lead to the + terminal. Connect the "-" power supply lead to the - terminal. Connect the electrical system ground to the **GND** terminal. The unit must be grounded for proper operation.

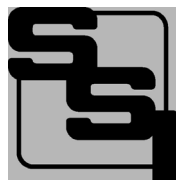
METER CONNECTIONS - The RTR-2SP's **Kin** and **XVin** terminals are connected to the meter. The RTR-2SP's **Yin** terminal is the "+" input for a dry-contact compatible pulse meter. The **Kin** terminal is the system's common return or ground, the negative of the meter, if polarized. Upon a closure of the meter's pulse switching device, the Yin input of the RTR-2SP is pulled down to ground. The Amber LED will light indicating that a pulse has been received. If the width of the input pulse is very short, the Amber LED may be difficult to see. Assuming the pulse meets the input criteria, the Green LED will light, indicating that a pulse output switch has closed, and thus a pulse output has occurred.

FUSES - The fuses F1 and F2 are type 3AG and may be up to 1/10 Amp in size. Two 1/10 Amp fuses are supplied standard with the unit unless otherwise specified.

INPUT and OUTPUT CONFIGURATION - Under the RTR-2SP's cover in the center of the board just below the lower fuse (F1) is a 7-position DIP switch labeled **S1**. This DIP switch allows the input and output timing configurations to be set. Switch #1 sets the Normal or Fixed output mode. Use the Normal mode to have the output pulse length match the input pulse length. The normal mode is generally necessary for high-speed and the length of the pulse varies with pulse input speed. Use the Fixed mode for a fixed output pulse width. Switches 5 and 6 set the input filtering time. Any pulse less than the selected input filtering time will be ignored and considered to be noise. Switches 2 thru 4 set the output pulse width if the Fixed mode is selected.

TEST MODE - The RTR-2SP includes a test mode to be able to detect very short width input pulses without additional test equipment. Enable the test mode by putting Switch 7 of S1 in the UP position. In this position, once a pulse is detected, it will latch on the RED LED to indicate that a pulse has been detected. Cycle the power to reset the LED. The test mode will detect pulses down to 50 microseconds. Put Switch 7 in the DOWN position for normal operation and reset the RED LED.

See page 3 of this sheet for additional information on selecting system settings. Transient suppression for the contacts of the solid state relay is provided internally.



SOLID STATE INSTRUMENTS

by Radian Research, Inc

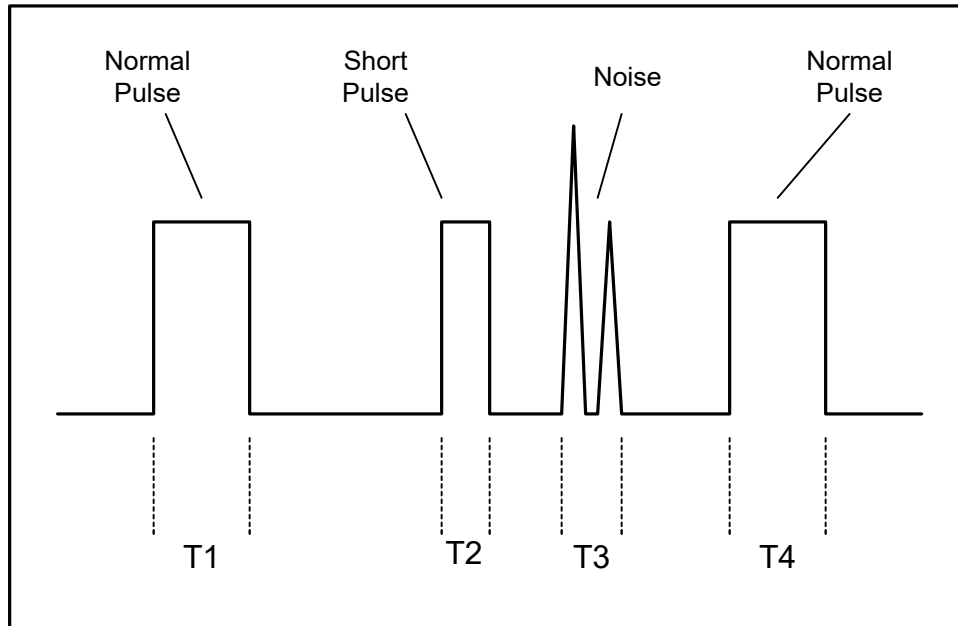
3852 Fortune Dr, Lafayette, IN 47905

Phone: (765) 449-5576

Mail: technicalsupport@radianresearch.com

WORKING WITH THE RTR-2 RELAY

BLOCKING NOISE: The RTR-2 has a built-in noise rejection software algorithm for detecting valid pulses from a sending source. The algorithm accomplishes this by measuring



the time the input pulse is present. If the input pulse is present for less than the specified time (in milliseconds) as determined by the position of switches **S1.5** and **S1.6**, it is assumed to be noise. An input equal or longer in duration than the specified time is classified as a valid input and an output will occur. In the illustration to the left,

the normal pulses with time durations of T1 and T4 will cause an output. The short pulse of time duration T2 and the noise with duration T3 will be rejected because the length of time (pulse width) is too short, even though the voltage is of sufficient magnitude. The time T4 could be many times as long as T1 and it would still be a valid time pulse since it has met the minimum time requirement. The time duration of 20 milliseconds (max) has been chosen as the factory-set default value since one cycle of the 60 hertz AC line frequency represents 16.67 milliseconds. Most induced noise and arcing discharges do not last longer than this, while most contact closures are a great deal longer. The minimum filter time of the incoming pulse may be modified by changing switches S1.5 and S1.6. See Table 2 on Page 3 for input filtering times.

OUTPUT PULSE DURATION: The RTR-2 can output two types of pulses - normal or fixed - depending upon the position of switch **S1.1**. In the UP position, the RTR-2 outputs a "fixed" pulse which has a duration determined by the position of switches **S1.2**, **S1.3** and **S1.4**. Once a valid pulse has been qualified, the output pulse will be set and the specified output time will begin timing out. See Table 3 on page 3 for the selectable output pulse lengths. If switch S1.1 is in the UP position and the incoming pulse is of sufficient time duration to be a valid pulse, but is less than 100 milliseconds, for example, the output time period will still be 100 milliseconds. Thus, the RTR-2 can be used as a "pulse stretcher". In the DOWN position, the RTR-2 outputs a "normal" (variable width) pulse which is the same duration as the valid input pulse. Thus, in fixed mode, the maximum pulse rate is dependent on the positions of switches S1.2 through S1.4. If no switches are switched up, the RTR-2 will default to the normal output mode, 20mS input time, and output will mirror the input pulse length.

CONFIGURING THE RTR-2SP RELAY

OUTPUT MODE - Set the Output Mode to either the Normal (equal to input time) or Fixed with Switch S1.1 as shown in Table 1.

Table 1

S1.1	Mode
Dwn	Normal (Variable) *
Up	Fixed

INPUT DEBOUNCE TIMES - The RTR-2SP contains four different input debouncing time options. A pulse received at the RTR-2SP's input must be present for at least the specified amount of time to be considered a valid pulse. Minimum pulse times can be set in the following times: 50uS, .5mS, 5mS or 20mS. For most electric meter pulse applications, the 20mS input time will be satisfactory. For high-speed pulse applications with water or gas meters, the minimum input time may need to be reduced depending on the meter's output pulse width. Table 2 below shows how to set switches **S1.5** and **S1.6** for the selected time.

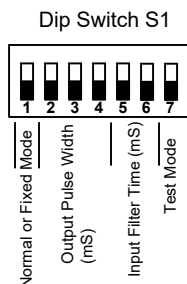


Table 2

S1.5	S1.6	mS
Dwn	Dwn	20 *
Dwn	Up	5
Up	Dwn	.5
Up	Up	50uS

FIXED MODE OUTPUT PERIOD - When **S1.1** is UP and selecting the fixed output pulse mode, the duration of the output time can be selected by using dip switches **S1.2** thru **S1.4**. Output times are selectable as follows: 5mS, 10mS, 20mS, 50mS, 100mS, 200mS, 500mS and 1000mS. The receiving equipment may require pulses to be of a given minimum length to be considered a valid pulse. If input pulses are received while a fixed output pulse is timing out, the RTR-2SP will store the received pulse(s) in an overflow register and output them as soon as the current pulse has timed out. The time between pulses is the same as the specified pulse time, giving a 50/50 duty cycle. A maximum of 65,535 output pulses can be stored. If the pulse rate from the meter is too high, pulses may be lost in the fixed mode if the output pulse register exceeds the 65,535 pulse maximum. In that case, the normal mode will have to be used. When in the operational mode, if stored pulses are present in the overflow register the RED LED will light.

Table 3

S1.2	S1.3	S1.4	mS
Dwn	Dwn	Dwn	5 *
Dwn	Dwn	Up	10
Dwn	Up	Dwn	20
Dwn	Up	Up	50
Up	Dwn	Dwn	100
Up	Dwn	Up	200
Up	Up	Dwn	500
Up	Up	Up	1000

* Note: Switches S1.1-S1.7 come factory-set to the "DOWN" position

CONFIGURING THE RTR-2SP RELAY (con't)

TEST MODE - Set the Test Mode switch to either the operating mode or the test mode as indicated by Table 4.

Table 4

S1.7	Mode
Dwn	Operating Mode
Up	Test Mode

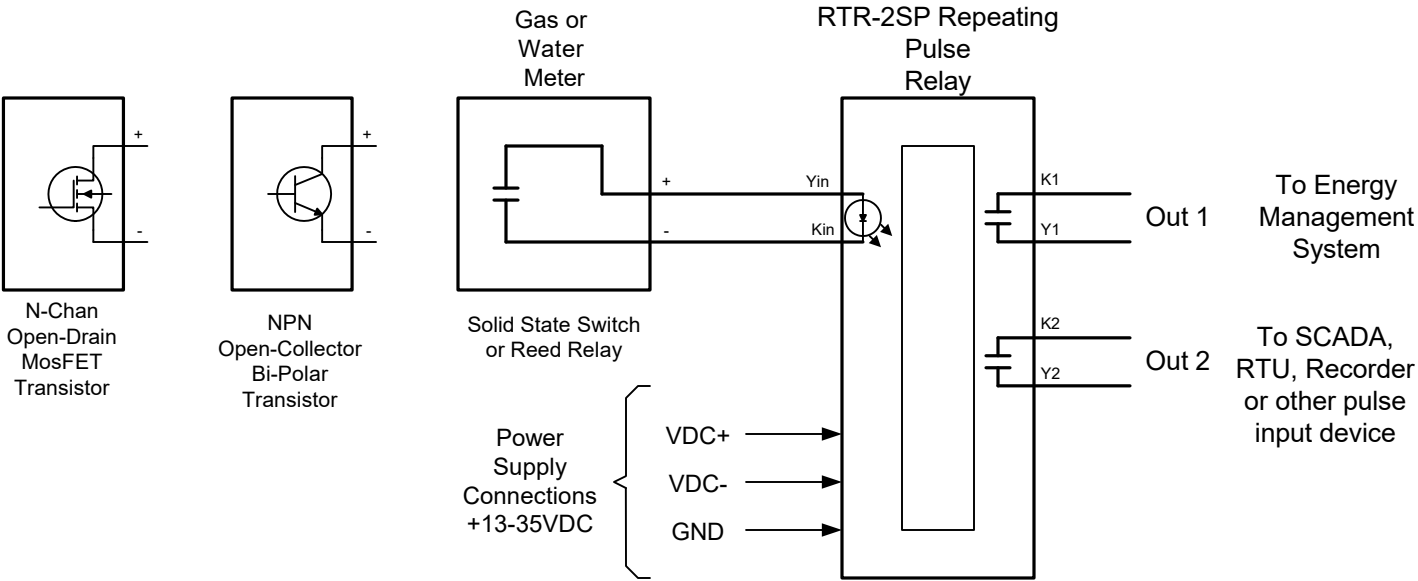
*

USING THE TEST MODE - Many water and gas meters have very high pulse rates with pulse durations or widths that are very short or narrow. Sometimes it is very difficult to observe pulses being received from the water or gas meter. To assist with detecting short pulses, the RTR-2SP has a built-in test mode. The purpose of test mode is to detect a pulse from the meter and latch the RED LED on to let the installer know that a pulse has been received by the RTR-2SP. Once the RTR-2SP has detected a pulse and latched the RED LED on, dip switch S1.7 can be returned to the down position to reset the RED LED to off.

Alternately the RTR-2SP can have its power cycled to reset the RED LED to continue monitoring for the next valid pulse.

In test mode, pulses continue to be processed and outputted.

RTR-2SP Wiring Diagram



RTR-2SP Generalized Repeating Pulse Relay Wiring Diagram		REVISIONS		Solid State Instruments by Radian Research Inc 3852 Fortune Dr Lafayette, IN 47905 (765) 449-5576 technicalsupport@radianresearch.com www.solidstateinstruments.com	
		NO.	DATE		DESCRIPTION
DATE ORIGINAL	SCALE				
01/01/2025	N/A				
LATEST REVISION	JOB NO.	CHECKED	DRAWN		
B2			WHB		